

What is Claimed:

1 1. In an absorption cooling system of the type which uses a refrigerant
2 and an absorbent and which includes a high stage generator, absorber, condenser,
3 heat exchangers, and an evaporator and means for connecting said components to
4 one another to form a closed absorption cooling system with said solution side of
5 said high stage generator being fluidically divided into two sections with a partition
6 plate whereby gas exiting one section at relatively high temperature is further cooled
7 in the second section which functions as a flue gas recuperator (FGR) to improve
8 overall burner efficiency.

1 2. The system of claim 1 in which the entire solution leaving the
2 absorber is passed through the FGR.

1 3. The system of claim 1 in which a fraction of the solution leaving the
2 absorber is passed through the FGR.

1 4. The system of claim 1 in which the stream of weak solution leaving
2 H2 is split with a fraction of said solution being heated in the FGR.

1 5. The system of claim 1 in which part of the solution entering G2 is
2 bypassed to the FGR.

1 6. In an absorption cooling system of the type which uses a refrigerant
2 and a lithium bromide absorbent and which includes a high stage generator,
3 absorber, condenser, high and low temperature heat exchangers, and an evaporator
4 and means of connecting said components to one another to form a closed
5 absorption cooling system with said solution side of said high stage generator being
6 fluidically divided into at least two sections with at least one partition plate whereby
7 gas exiting one section at relatively high temperature is further cooled in the second

8 section which functions as a flue gas recuperator (FGR) to improve overall burner
9 efficiency.

1 7. The system in claim 1 in which the said FGR recovers about 20-40%
2 of the waste heat available in the flue gas.

1 8. The system in claim 1 in which the said FGR recovers about 30% of
2 waste heat available in the flue gas.

1 9. The system in claim 1 in which all of the weak solution that is
2 circulated in the absorption cycle is passed through a FGR before entering in low
3 temperature heat exchanger to exchange heat with exhaust gas leaving high stage
4 generator section to eliminate the danger of crystallization of strong solution in the
5 low temperature heat exchanger.

1 10. The system in claim 1 in which a fraction of weak solution that is
2 circulated in the absorption cycle is passed through the FGR to exchange heat with
3 exhaust gas leaving the high stage generator section.

1 11. The system of claim 10 in which solution leaving the FGR is mixed
2 with heated weak solution leaving the high temperature heat exchanger.

1 12. The system of claim 11 in which the fraction of solution passing
2 through the FGR is such that temperature of solution leaving FGR is +/-10 degree C
3 when compared to temperature of heated weak solution leaving the high temperature
4 exchanger.

1 13. The system of claim 10 in which solution leaving the FGR is mixed
2 with heated weak solution leaving the low temperature heat exchanger.

1 14. The system of claim 13 in which the fraction of solution passing
2 through the FGR is such that the temperature of solution leaving the FGR is +/-5
3 degree C when compared to temperature of heated weak solution leaving low
4 temperature heat exchanger.

1 15. The system in claim 12 in which the fraction of solution flow entering
2 the FGR is determined by use of an orifice.

1 16. The system in claim 12 in which the fraction of solution flow entering
2 the FGR is determined by use of a mechanical valve.

1 17. The system in claim 12 in which the fraction of solution flow entering
2 the FGR is determined by use of an electronically controlled valve.

1 18. The system in claim 14 in which the fraction of solution flow entering
2 the FGR is determined by use of a mechanical valve.

1 19. The system in claim 14 in which the fraction of solution flow entering
2 the FGR is determined by use of a mechanical valve.

1 20. The system in claim 14 in which the fraction of solution flow entering
2 the FGR is determined by use of an electronically controlled valve.

1 21. In an absorption cooling system of the type which uses a refrigerant
2 and an absorbent and which includes a high stage generator, absorber, condenser,
3 high and low temperature heat exchangers, and an evaporator and means for
4 connecting said components to one another to form a closed absorption cooling
5 system with said solution side of said high stage generator being fluidically divided
6 into two sections with a partition plate whereby gas exiting one section at relatively

7 high temperature is further cooled in the second section which functions as a flue gas
8 recuperator (FGR) to improve overall burner efficiency.

1 22. The system in claim 21 in which a fraction of the stream of the weak
2 solution leaving the low temperature heat exchanger is passed through the FGR to
3 exchange heat with exhaust gas leaving the high stage generator section.

1 23. The system in claim 21 in which the fraction of solution passing
2 through the FGR is such that the temperature of the solution leaving the FGR is +/- 5
3 degree C when compared to the temperature of the heated weak solution leaving the
4 high temperature heat exchanger.

1 24. The system in claim 21 in which a fraction of the solution entering
2 the low stage generator is bypassed to exchange heat in the FGR to produce
3 refrigerant vapor.

1 25. The system in claim 24 in which the fraction of the solution entering
2 FGR is such that concentration of solution leaving FGR is equal to concentration of
3 solution leaving low stage generator.

1 26. The system in claim 24 in which the fraction of solution entering the
2 FGR is such that the absorbent concentration of solution leaving the FGR is within
3 +/- 0.5 percent absolute when compared to the absorbent concentration of solution
4 leaving the low stage generator.

1 27. The system in claim 24 in which the vapor portion of the FGR and
2 vapor portion of the low stage generator are fluidically connected to operate at a
3 pressure difference not exceeding 0.2 torr.

1 28. The system in claim 21 in which weak solution entering the high
2 temperature heat exchanger is heated with the FGR.

1 29. The system in claim 28 in which solution entering the FGR is the
2 entire weak solution leaving the low temperature heat exchanger.

1 30. The system in claim 21 in which the said absorbent is lithium
2 bromide and the said refrigerant is water.

1 31. The system in claim 21 in which said solution side of said high stage
2 generator is fluidically divided into more than two sections with partition plates
3 between each connecting section, whereby gas exiting one section at a relatively
4 high temperature is further cooled in said subsequent sections (FGR) to improve
5 overall burner efficiency.

1 32. The system in claim 21 in which the said two sections are connected
2 to the said partition plate with a weld joint.

1 33. The system in claim 21 in which the said two sections are connected
2 to the said partition plate with a removable flange connection.

1 34. The system in claim 21 in which the effectiveness of the said heat
2 exchangers is between about 80% and 95%.

1 35. The system in claim 34 in which the preferred effectiveness of said
2 heat exchangers at full load operating condition is about 85%.

1 36. The system in claim 34 in which preferred effectiveness of the said
2 heat exchangers at full load operating condition is about 95%.